ENVIRONMENTAL PERCEPTIONS IN RESPONSE TO ENVIRONMENTAL DESIGN EDUCATION

by

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> For lo the winter is past,
> the rain is over and gone;
> The flowers appear on the earth;
> the time of the singing of birds is come.
> Arise, my love, my fair one, and come away.
> -- Song of Solomon

The deed has been done. Completion of this document brings to a close a chapter of life which has been both challenging and rewarding. As in any endeavor of such magnitude, many have contributed, many have supported, and many have provided in order to make this possible.

Quality control in this process has been the domain of my graduate thesis committee. Their contributions and support have kept the research process flowing throughout. Thanks also to the faculty members of the Landscape Architecture department as well as faculty from Statistics, Curriculm and Instruction, and Planning and Evaluation who so generously provided professional expertise and time.

> "Sans pain, sans vin, l'amour n'est rien!"
> (Without bread, without wine, love is nothing)
> -- French proverb

Without friendship, without sharing, life is nothing. My classmates have shared both their professional skills and personal interests in making this period of life enjoyable and meaningful. The support and companionship of such friends make all things possible and all life worth living well.

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"...a cultivation of sensibility, a refined taste in natural objects" can be accomplished by "building receptivity into the still unlovely human mind" (Leopold 1966, p.295).

CHAPTER I
INTRODUCTION

The human perception of and attitude towards the natural environment have a major effect on our physical and cultural landscape. "The relationship of a society to its environment is the first and most important challenge to a culture" (Chemers and Altman 1977, p. 44).

Education can be the link between society and environment. Education can be the means by which we formulate relationships between our cultural behaviors and physical manipulations of the surrounding landscape.

One important component of education are the processes by which children formulate ecological value systems. It is during childhood that individuals develop an awareness of human intervention in the natural order and begin to realize that this intervention may produce deleterious effects (Rejeski 1982).

During childhood, environmental awareness and behavior may be impacted. For example, cognitive tendencies towards environmental perception are determined either biologically or by early socialization (Chemers and Altman 1977).

Landscape architecture, as a profession which promotes land stewardship, should be concerned with childhood development of environmental awareness, behavior and perception. What children learn and perceive about the environment has major implications for the shape of landscapes to come. The questions and problems the landscape architect faces are directly linked to how individuals view the natural world.

> "...our view of where we fit in the whole of reality can have enormous impact on our personal and political ideas about these issues" (Ebenreck 1983, p.21).

Understanding this "fit" is crucial. As professional practitioners and educators in the fields of environmental design and management, landscape architects also need to develop an awareness and knowledge of the critical connections between humans and the natural environment. Relationships exist between human behavior and the natural and cultural landscape which landscape architects as educators and as practitioners need to understand.

These research studies should focus on how human behavior affects the allocation and use of natural resources and in turn on how societal values and attitudes are affected by the natural environment. Needed are the means to evaluate human behavior and perceptions.

RESEARCH OBJECTIVES

The purpose of this research was to examine and measure the environmental perceptions of a population of sixth-grade children. The study was conducted to determine whether or not significant differences in preference, awareness, and perception existed between students who had participated in an environmental education design program and those who had not.

There were six objectives of this research.

1) the development of measurement instruments with application to a specific education program and specific population.

2) the testing of the developed instruments in the collection of data for the analysis of:

   A. Environmental preference
   B. Environmental awareness
   C. Environmental perception

3) the statistical analysis of test data for use in comparison of program (test) and non-program (control) student ratings.

4) the evaluation of possible changes in preference, awareness, and perception as a result of participation in an environmental design education program.

5) the examination of overall study results with regard to tested evaluation techniques and procedures.

6) the development of recommendations for future research studies.

THE GOALS OF ENVIRONMENTAL EDUCATION

The major goal of environmental education is to improve people's attitudes and corresponding concerns for and towards the landscape. Positive attitudes and behaviors can subsequently affect the physical landscape by reducing people's environmentally destructive actions.

This goal is achieved through the objectives of environmental education which are to 1) provide facts and information about the environment, 2) help develop environmental awareness and concern, and 3) help produce a citizenry that has the ability to make appropriate environmental decisions and take effective social action (Hendee 1972).

Environmental education programs can provide a positive impact on the developing environmental perceptions and attitudes of children. Childhood experience has been cited as the single best predictor of people's response to landscape (Zube 1983). Childhood experience also may be determinative and able to control the way people see the landscape for the rest of their lives (Opie 1983).

Environmental design education may increase children's feelings of responsibility for human interactions with the landscape, a necessary goal of our educational systems.

The study and evaluation of children's feelings of environmental responsibility are needed in determining the effectiveness of educational techniques and methods. Accurate evaluation procedures can identify and further strengthen educational goals and objectives.

Program funding in environmental education has been drastically reduced. The effective evaluation of environmental education programs is needed to establish evidence of the value of such programs thereby strengthening the rationale for inclusion in funding budgets. Laws, such as the Environmental Education Act of 1970, once provided direction and support (O'Hearn 1982). Budgetary cuts and lack of political support have combined to repeal this act and eliminate new opportunities.

Documentation can provide significant insights. Needed are insights into childhood development of environmental awareness, concern and responsibility. The implementation of these objectives should be a function of our early educational and socialization process. Quantifying the documentation of these insights will allow effective and accurate evaluation.

ENVIRONMENTAL DESIGN PROGRAM

The environmental design education program examined was offered in the Fall of 1985 in Salina, Kansas. This program was sponsored by the Salina Arts and Humanities Commission with the cooperation of the Salina school system U.S.D. 305. The educational goals of this program were developed by Judith Major (1985) and were to:

1. Promote an awareness of the richness of Salina's existing open spaces and to encourage the use of these resources.
2. Promote an understanding of the complexity of these open spaces -- as nature, as works of art, as settings for human activities.
3. Promote an awareness that these environments result from individual and group action; people of the community are actors rather than passive recipients.

The research study surveyed two groups of sixth-grade children from Salina, Kansas -- one group which participated in the environmental design program (test), and one group which had not (control). A survey instrument was developed which measures participants' environmental preferences and awareness. This instrument utilized techniques of visual analysis with photographic slides, and a survey questionnaire.

The data collected from participant surveys were analyzed to determine significant statistical differences or trends in student responses. In addition, analyses were performed to determine possible correlations between individual response patterns and of participants' sex, age, and residence setting. The analysis of these data explore the impact of the environmental design education program on the feelings of environmental responsibility of the children who participated in the program.

This study quantified measures of environmental responsibility. Data are presented which demonstrate the impact of environmental design education on developing preferences, awareness, perceptions, and responsibilities of children towards the surrounding physical landscape.

Education may provide positive impacts. Educating people to the possibilities and limitations of their surroundings may allow them to better understand themselves and their relationship to the physical world. The outcomes of this environmental understanding will be evident in the health and appearance of the landscape. A finite world of resources requires the development of environmentally responsible citizens. Education and evaluation are required.

THESIS FORMAT

Chapter II presents the historical and contextual issues which provide the necessary foundation information for the study. Included are historical perspectives in human landscape perception, landscape assessment studies, environmental behavior and disposition, and childhood development of environmental perception. Landscape preference studies, environmental attitude and values research, and environmental education evaluation are reviewed and discussed. Chapter III covers the research methodology and procedures involved in defining study variables. Chapter IV summarizes the data collected and describes the statistical methods used in the analysis of this information. Chapter V is an evaluation of the study and contains conclusions and recommendations.

OPERATIONAL DEFINITIONS

For the purposes of this study, specific meanings have been associated with the following terms and concepts.

*Attitude -- A manner of acting, feeling or thinking that shows one's opinion or mental disposition toward a fact or state.

*Awareness -- A knowledge of something through alertness in observing or in interpreting what one sees, hears, and feels.

*Disposition -- A tendency, mood, or inclination of someone to act in a certain manner under given circumstances.

*Environment -- The aggregate surroundings of biological functions, social and cultural conditions that influence the life of an individual or community.

Human-influenced landscape -- An area or scene which shows noticeable, visible amounts of human impact and alteration.

*Landscape -- The visual properties of the environment, the portion of view that the eye can take in from a single view.

Naturalistic landscape -- An area or scene which is predominantly made up of plants, animals and earth, that have been produced by or exist in nature.

**Perception -- A process by which humans inform themselves about objects and the processes that are exhibited in the objects, via sensory stimulation.

*Preference -- A liking of, a desire for a specific thing, object, space or situation.

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* Webster's Seventh New Collegiate Dictionary. 1971. G. & C. Merriam Co.

** Macia, A. 1979.

"The world is a beautiful book, but of little use to him who cannot read it."
Carlo Goldoni: Pamela nubile, I, 1757

CHAPTER II
BACKGROUND

Cultures have been characterized in terms of whether they see people as subjugated to nature, part of nature, or dominating nature (Kluckhohn 1953). Changes in our cultural and individual perception of the landscape can occur as more information about the nature of the surroundings is made available, either through direct experience or past knowledge.

ENVIRONMENTAL EVOLUTION

The evolution of human culture took place in an environment of total wilderness. Thousands of years of pre-civilized life in the wilderness directly affected the physiological and psychological development of the human species. Physical and cultural existence could only take place when some control over the surrounding environment took place.

Attitudes towards nature evolved throughout pre-civilization to the present. Early folk beliefs incorporated humans as an integral part of nature (Nash 1967). As Christianity replaced the pagan religions of medieval society, a different philosophy of human/nature relationships came into being. Christianity separated humans from nature and destroyed the ancient oneness of man and nature (Stilgoe 1982).

This attitude of separation continued until the environmental movement of the late 1960's and early 1970's. New philosophies of thought emerged during this latter period of environmental activism which linked human quality of life and survival to the condition and biologial health of the physical environment. A process of "ecological evolution" began to occur in which ethical principles were applied to human/environment interactions.

> "Individual thinkers since the days of Ezekiel and Isaiah have asserted that the despoliation of land is not only inexpedient but wrong. Society, however, has not yet affirmed their belief. I regard the present conservation movement as the embryo of such an affirmation" (Leopold 1970 p. 45).

DEVELOPMENT OF LANDSCAPE PERCEPTION

Human evolution determined the environmental preferences of modern humankind. The need for security and sight, both of which were necessary for survival, are seen in our preference for open meadows, forest edges and hillside vantage points (Nash 1967). Pre-civilized humans had to depend on knowledge and perception to survive.

Landscape features have been identified as symbols of prospect, refuge, or hazard (Appleton 1975). Natural elements such as vegetation and landforms either presented security or danger with mistakes in perception being costly to survival.

Evolutionary and historical changes in human attitudes and perceptions of the landscape must be kept in mind within the context of this study. These past changes in cultural and individual perceptions of the environment provide a starting point, an initial perspective from which we can begin to study modern human perceptions.

Perceptions and preferences for landscape settings have been studied to determine how and why we act and react to the physical environment as we do. Identifiable factors in the historical development of environmental preference have been described by S. Kaplan (1979). A preference matrix has been summarized which illustrates possible concepts in the study of human/environment interactions. (Figure 2.1)

Figure 2.1 Preference Matrix

Level of Interpretation	Making Sense	Involvement
Present or Immediate	Coherence	Complexity
Future or Promised	Legibility	Mystery

These concepts describe meanings in the landscape which people relate to in an involuntary or subconscious way. The result of our evolutionary and adaptive history is that people prefer landscapes in which involvement and making sense leads to acquiring accurate landscape information (Ulrich 1977). The four factors presented in Figure 2.1 address the present/immediate needs and future/longer-term possibilities that humans can identify through the visual perception of the environment. These four factors in landscape perception have been summarized by Gimblett, Itami, and Fitzgibbon (1985) from S. Kaplan (1979).

Coherence -- The extent to which the scene "hangs together" through repetition of elements, textures, and stuctural factors which facilitate comprehension.

Complexity -- The amount of variety or diversity in a scene; a scene having enough information present to keep one interested or occupied.

Mystery -- The degree to which more information may be gained by proceeding further into the scene.

Legibility -- The recognition of an environment that looks as if one could explore it extensively without getting lost.

The human reaction to a particular landscape is dependent on the familiarity one feels towards that landscape. Familiarity can be gained by past experiences with that landscape or through prior information which helps people "make sense" of the surrounding environment (Hammitt 1979). Through past experiences, people process information which aids in their perception and knowledge of future environments (Kaplan and Kaplan 1978).

> "...uniqueness is valued...when a place has a distinctiveness, a 'sense of place,' that makes it possible to know where one is whenever one visits that place" (Kaplan, S. 1979, p.247).

This "making sense" can be the knowledge or understanding of the elements which makes up a particular landscape. In the history of human evolution the knowledge and understanding about the environment an individual received came about due to direct experiences "in the field", and from oral histories and traditions.

> "The feeling that a particular place is suffused with memories, the specific focus of sacred and profane stories, and that the whole landscape is a congeries of such places, is what is meant by a local sense of the land" (Lopez 1986, p.278-279).

The lifestyle of civilized cultures has separated people from this direct physical contact with the natural environment. Environmental problems have developed because of our inability to develop a system of social values, life styles, and institutions which allow harmonious coexistence with the land (Swan 1974).

Environmental education can function as a means of transmitting information about and awareness of the physical environment to individuals within our society. An appreciation of the landscape can be more personal and long lasting when there has been an opportunity for direct experience and a memory of those incidents (Tuan 1974). Education can provide the experience and information needed to understand the physical environment. Experience with the landscape modifies and influences this human perception and preference (Helson 1964).

> "To carry in life the knowledge that 'one's place' is beautiful is to carry a sense of one's own value - no small matter in a society increasingly plagued by doubts about its directions and possibilities" (Ebenreck 1983 p.22).

The study of human development in landscape perception must include a consideration of the complexity and variety of the outdoor environment. Past research in environmental psychology has identified factors that are specific to the interaction of humans and landscape. These considerations were developed by Ittelson (1973, p.12-15) and summarized by Zube, Sell and Taylor (1982). (Figure 2.2)

Figure 2.2 Landscape Modes

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1. Landscapes surround. They permit movement and exploration of the situation and force the observer to become a participant.

2. Landscapes are multimodal. They provide information that is received through multiple senses and that is processed simultaneously.

3. Landscapes provide peripheral as well as central information. Information is received from behind the participant as well as from in front, from outside the focus of attention as well as within.

4. Landscapes provide more information than can be used. They can simultaneously provide redundant, inadequate, ambiguous, conflicting and contradictory information.

5. Landscape perception always involves action. Landscapes cannot be passively observed; they provide opportunities for action, control and manipulation.

6. Landscapes call forth actions. They provide symbolic meanings and motivational messages that can call forth purposeful actions.

7. Landscapes always have an ambience. They are almost always encountered as part of a social activity, they have a definite aesthetic quality and they have a systemic quality (various components and events are related).

These seven considerations describe both the actual stimulus provided by the environment to the participant (items 1 through 4) and the actions or outcomes induced by this contact (items 5 through 7). The landscape thus exerts considerable influence on human perception by providing meanings and opportunities.

LANDSCAPE PREFERENCE STUDIES

The interactions between people and the environment have been studied using the technique of visual analysis. Visual analysis can be used as a basis for assessing and analyzing human perceptions of the landscape.

People depend on vision to make sense of the outdoor environment. Vision is by far the most important sense in yielding information about the landscape to influence human perception (Ulrich 1979). Visual analysis utilizes the human reliance on sight to identify and measure individual preferences for landscape scenes. These preferences are the result of 1) the viewing of a landscape and 2) a judgment concerning the kinds of experiences expected to occur in the viewed environment (Kaplan, S. 1979).

Landscape analysis and assessment has been used to determine human preference. One approach to landscape assessment has been humanistic, which deals with the ways in which information influences landscape preference. This approach stresses the involvement of the observer as a participant in the landscape (Rodie 1985). Environments which involve the individual will provide a greater sense of understanding, and will be preferred by that viewer (Kaplan and Kaplan 1982).

Landscape preference can change throughout an individuals lifetime due to cultural influences (Balling and Falk 1982). Experience can influence human perception and preference (Helson 1964). Feelings towards a particular landscape can be learned (Zube 1983), which indicates that educational experiences may have the ability to change an individuals innate preference for landscape.

More specific factors which influence the understanding of a person's environmental perceptions and preferences are biological heritage, upbringing, education and physical surroundings (Tuan 1974). These variables have been correlated with regard for both adults and children. Gender and personality have both been identified as influences on visual perceptions (Macia 1979). Kaplan (1977) also demonstrated a relationship between environmental preference and personal attributes through the specific personality characteristics of participants.

The identification of landscape perceptions describes outcomes of the human/environment interaction. Four paradigms in the field of landscape perception research have been identified (Zube, Sell and Taylor 1982). (Figure 2.3)

Figure 2.3 Landscape Perception Paradigms

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1. The expert paradigm. The evaluation of landscape quality by skilled and trained observers. Training in art and design, ecology or in resource management are assumed to provide intrinsic aesthetic effects.

2. The psychophysical paradigm. Landscape aesthetic qualities or landscape properties are evaluated by the general public or selected populations'. The external landscape properties are assumed to have a correlation or stimulus-response relationship to the observer evaluations and behavior.

3. The cognitive paradigm. This method involves a search for human meaning associated with landscapes or landscape properties. Information is received by the human observer and is combined with past experience, future expectation, and sociocultural conditioning to lend meaning to the landscape.

4. The experiential paradigm. This involves the consideration of landscape values to be based on the experience of the human-landscape interaction, with both being shaped and shaping in an interactive process.

The major research direction of this study involves a combination of cognitive and experiential paradigms. The slide preference survey rated viewers satisfaction-dissatisfaction and preference for landscape scenes. This survey examined meanings through measurements of the cognitive paradigm.

A questionnaire survey was also used which evaluates the interactive experiential relationships between participant and landscape. The relationship between the cognitive and experiential paradigms and the elements which make up the evaluative model are identified. (Figure 2.4).

Figure 2.4 Relationships of Model Elements and Landscape Perception Paradigms

	Cognitive	Experiential
Human model	Observer as processor	Active participant
Landscape properties	Associated with obtaining information and meaning: Mystery Prospect Legibility Refuge Identifiability Hazard	World of everyday experience: Familiarity Social space Landscape style
Interaction outcomes	Meaning Ratings of satisfaction-dissatisfaction and preference Stress reduction Adaptation Arousal	Habitual behavior Understanding of human and landscape development Change Statements of landscape taste Enhancement of sense-of-self

Note: Adapted from Zube, Sell, and Taylor (1982).

CHILDHOOD DEVELOPMENT OF ENVIRONMENTAL AWARENESS

Studies have indicated (Hart and Moore 1973, Stea and Blaut 1973, and Blaut, McCleary and Blaut 1970) that certain cognitive tendencies have evolved which provide children early and effective environmental perception. Anthropologists studying Native American cultures have found that at six months of age the typical tribal conceptions of life have begun to permeate and influence the child (Leighton and Kluckhohn 1947). These findings suggest that perceptions and knowledge about the environment can be learned at an early age.

> "There is a special period, the little-understood, prepubertal, halcyon, middle age of childhood, approximately from five or six to eleven or twelve- between the strivings of animal infancy and the storms of adolescence-when the natural world is experienced in some highly evocative way, producing in the child a sense of some profound continuity with natural processes and presenting overt evidence of a biologial basis of intuition" (Cobb 1969, p.123-124).

This "middle age" of childhood is a crucial period of development for human beings. Children have a natural curiosity about the world, which needs to be nurtured by adults (Tuan 1978). It is at this stage of development that the adolescent begins to explore the link between the human and natural environment and exhibits the cognitive capacities for understanding natural ecosystems

(Rejeski 1982). By twelve years of age, children can deal with complex spatial environments and move through the urban environment on their own (Moore 1979, Smith 1979, Sonnenfeld 1982, as cited by Bunting and Cousins 1985).

In early adolescence the child becomes conscious of the ability to relate past information to problem-solving activities which permits systematic and logical reasoning (Mussen, Conger, and Kagan 1974). Children can begin to apply the processes of problem-solving and reasoning to human values and behavior. An awareness of environmental behavior (negative and positive) and the concept of spaces (public and private) can develop which is crucial to the formation of ecological value systems (Rejeski 1982).

The early adolescent years have been targeted for educational and rehabilitative programs. Outdoor therapy programs consisting of fifth- and sixth-grade children have been shown to produce positive change in program participants (Burdsal and Buel 1980). More adaptive behaviors in terms of interacting with adults were observed.

It has been proposed that instruction in environmental education take place in elementary and/ or middle school (Knapp 1972). Studies have shown that environmental dispositions begin to develop at a relatively early age and that environmental personality traits can be reliably measured by elementary school age (Bunting and Cousins 1985). Elementary school children have been shown to exhibit slightly positive attitudes toward the environment without the intervention of formal instruction. In addition, minimal instruction in environmental education at the third-grade level 1) significantly improved these positive attitudes toward the environment and 2) allowed participants to retain these positive attitudes over time (Jaus 1984).

LEARNING PROCESSES AND COMPONENTS

An educational evaluation process must take into consideration the variables and concepts involved in student learning. An evaluation must deal with the topics and levels of learning that have been taught (Bloom 1956). This involves the study of the learning process and progression with the subsequent identification of educational components.

Three variables can be used to study the learning process. Cognitive growth involves the development of knowledge and understanding of concepts and facts. Students' ability to apply abstractions, analyze, synthesize, and evaluate are results of cognitive growth. Affective growth covers the feelings or emotions, likes and dislikes, and attitudes and values towards objects. Psychomotor skills involve the carrying out of physically and mentally co-ordinated activities (Bennett 1977).

Cognitive growth in critical thinking, problem-solving skills, and concept development can be facilitated by combining outdoor education with classroom studies (Backman and Crompton 1984/85). The transmission of facts and information through cognitive development is of primary concern to some educators (Hendee 1972).

The affective component of environmental education has been described as being of more value to students and society (Moyer 1977). Other environmental educators have argued for stressing affective objectives with the main thrust of programs aimed at changing human attitudes, values and beliefs (Doran 1977). It has been concluded (Tanner 1974, as cited in Borden and Schettino, 1979) that a combination of both cognitive and affective components must be stressed.

The environmental design education program examined in this study contributed to each of these three variables of cognitive, affective and psychomotor components. The survey instrument which was developed, focused on these cognitive and affective components of student learning which have been shown to be measureable and identifiable.

The accurate measurement of levels of learning in a study such as this are essential to the collection of accurate data. To measure or test for the desired indicators requires an understanding of these levels. Six levels of learning have been identified (Bloom 1956). (Figure 2.5)

Figure 2.5 Levels of Learning

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1. Knowledge-Memory -- simple recognition or recall, of ideas, facts, material or phenomena.

2. Comprehension -- ability to make some use of material or ideas and to know what is being communicated.

3. Application -- the use of abstractions (ideas, principles, theories, and procedures) in particular and concrete situations.

4. Analysis -- the recognition of elements, relationships, and organizations of communicated materials.

5. Synthesis -- the process of working with and creating new patterns with the elements and parts which have been communicated to the individual.

6. Evaluation -- the making of judgements about the value of ideas, methods, materials, or solutions.

Testing for these levels of learning varies in effectiveness and complexity. As one proceeds through the progressive levels, measurement becomes more complex. These six levels represent a progression in the educational process with each successive level depending on the mastery of each of the preceding (Bloom 1956). The survey instrument used in this research study was designed to measure levels of learning at each of the six levels with the main focus being on comprehension and application categories.

ENVIRONMENTAL BEHAVIOR AND DISPOSITIONS

The measurement and analysis of human landscape preference and environmental awareness can be studied through techniques of environmental dispositions and personality. Environmental dispositions denote individual variations in the styles of relating to the everyday physical environment (Craik and McKechnie 1977).

Several instruments have been developed which assess the individual personality and disposition towards the environment. These methods of assessment have been used in human/environment studies to forecast significant environmental behaviors of people.

The Environmental Preference Questionnaire (EPQ) has been used to identify sources of satisfaction and patterns of preference pertaining to environmental settings (Kaplan, R. 1977). The EPQ demonstrates a link between environmental preference and behavior by measuring responses to scales representing:

Nature
Romantic Escape
Modern Development
Suburbs
Social
Passive Reaction to Stress
City

The Environmental Response Inventory (ERI) is an assessment questionnaire which identifies and quantifies individual responses to the physical environment (McKechnie 1977). Eight domains of personality scales represent a set of dimensions which best describe these responses.

Pastoralism
Urbanism
Environmental Adaptation
Stimulus Seeking
Environmental Trust
Antiquarianism
Need Privacy
Mechanical Orientation

These response categories were aimed at measuring a broad spectrum of environmental response styles and are assumed to identify both childrens' and adults' environmental dispositions.

Bunting and Cousins (1985) developed a similiar set of scales which focus more directly on the youth population. The Children's Environmental Response Inventory (CERI) was introduced as a means of measuring children's (aged 9 - 16 years) "environmental personality."

The final method to be mentioned is the Environmental Personality Inventory (EPI) which was developed to measure environmental dispositions (Sonnenfeld 1969). This inventory measures individual's 1) sensitivity to the environment, 2) control over the environment, 3) mobility, and 4) environmental risk taking.

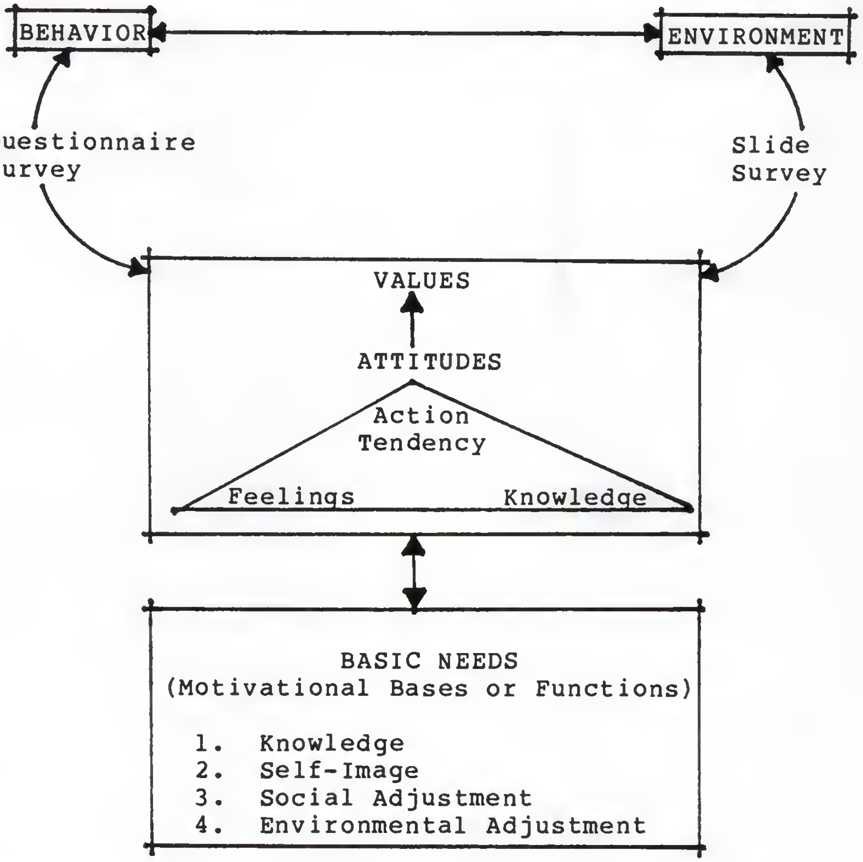
These methods of assessment are important in the prediction and understanding of specific environmental behaviors and outcomes (Craik and McKechnie 1977). The information gained from these studies can be used in the analysis of human behavior, attitudes, and values towards the physical environment. These factors can determine individual actions with regard to ecological responsibility, locus of control and environmental preference.

The role of environmental behavior and the effect of knowledge on these behaviors are an important aspect of this research study. The measurement of individual responses in this research study is directly related to the possible effects of environmental design education upon environmental dispositions.

Programs in environmental education have been designed to produce change in the "environmental personality" of children. The indications are that educationally oriented information programs may be successful in gaining behavioral committments to pro-environmental behavior (Arbuthnot 1977). These behaviors have been shown to exist more frequently in individuals who are 1) well-informed and knowledgeable about environmental issues, 2) less bound to past ways of believing and acting, and 3) have a strong sense of control over their own lives.

A theoretical model for evaluation of environmental education programs has been proposed (Bennett 1974). It is illustrated in graphic form (Figure 2.6) on the following page. This model illustrates the outcomes of feelings, knowledge and action tendencies towards behavior and environment. Included in this model are the survey procedures (slide and questionnaire) developed for evaluation of the Salina environmental design program.

Figure 2.6 Behavioral Evaluation Model



Note: Adapted from Bennett 1974

The studies described in this chapter provide a basis for research. The focus of this study is on the further development of measurement techniques, the identification of relevant variables and the determination of educational impacts.

PROGRAM DESCRIPTION

In the fall of 1985 an environmental design program entitled "The Nature and Artistry of Salina's Open Spaces" was presented to fifth-grade students in Salina, Kansas. This Artist in Residence program was funded by the National Endowment for the Arts under the direction of The Salina Arts and Humanities Commission. Judith Major, as Artist in Residence, developed the ten-week curriculum which consisted of ten one-hour programs. This series of ten programs was presented to six fifth-grade classes in Salina, Kansas.

Lectures, slide shows, and hands-on projects were used to emphasize environmental design as an art "...which gives form and order to outside spaces..." while "...encouraging a sensitivity to our surroundings" (Major 1986, p.82). Overall goals of the program were to develop:

1. An appreciation of the opportunities that exist in the students' community's system of designed landscapes including school yards, campuses, lawns, streets, cemeteries, parks, and playgrounds.

2. An awareness of the design influences which shape the creation of these spaces as nature, art, and human activity settings.

3. The sense of personal involvement and the impact that group or individual action can have on the environment.

A brief overview of each of the ten programs is presented in the following section. The contents of this section have been summarized from the course outline prepared by Judith Major (1985).

1. Lecture/Slide show/Hands-on-project.
Subject Matter: Science, Art
*Demonstration of drafting tools and a discussion of environmental design as a profession.

2. Discussion/Demonstration.
Subject Matter: Social Studies, Language Arts, and Art.
*Concepts of Open Space -- mass/void, positive/negative, buildings and open space.

3. Slide show/Discussion.
*Display of park maps - open spaces and features of landmarks, edges, paths, and nodes.

4. Lecture/Slide show.
Subject Matter: Social Studies, Science, Art
*The nature of open spaces through presentation of space, shape, form, scale, light, shadow, texture, and color as elements of environmental design and open spaces as settings for human activities.

5. Lecture/Slide show/Hands-on-project.
Subject Matter: Science, Art
*Indentification of characteristics of common trees found in Salina's parks -- construction of tree crown hats.

6. Lecture/Slide show/Hands-on project.
Subject Matter: Science, Math, Art
*Land forms as design elements -- scale, enclosure, screening, and terminology associated with ground forms and construction grading.

7. Discussion/Field trip/Hands-on-project.
Subject Matter: Language Arts, Art
*Parks as works of art -- designed elements of structure, landscape and built environment. Photography project with each student recording images of a park's manmade parts.

8. Lecture/Slide show/Hands-on-project.
Subject Matter: Social studies, Math, Art
*Student design/construction of a model entrance feature, concept of scale and characteristics of entrances, doorways, gates.

9. Slide show/Discussion/Writing project.
Subject Matter: Language Arts, Social Studies
*Parks as settings for activities -- active and passive recreation, specific areas in parks for doing specific activities.

10. Slide show/Discussion.
Subject Matter: Social Studies
*Various impacts on parks -- roles and effects of students and users of park areas, aspects of maintenance and care of park lands.

As a final product of this series of programs, a booklet was prepared by the student participants and Ms. Major. This booklet contained essays, poems, drawings, and models created by the students througout the course of the program and served as a students' guide to "Indian Rock, Sunset, and Oakdale Parks" (Major 1985-A).

CHAPTER III
METHODOLOGY

This study was designed to determine whether or not an environmental design education program can produce changes in environmental preference and awareness in a specific population of elementary school students. The survey instrument utilized a two part presentation, consisting of a photographic slide survey and a written questionnaire. Quantitative data were gathered using the test instrument and analyzed to test the following seven hypotheses.

RESEARCH HYPOTHESES

SLIDE SURVEY HYPOTHESES - Students who participated in the environmental design education program would show a higher visual preference for outdoor scenes in the categories of:

A1. Naturalistic urban open space.
A2. Human altered-influenced urban open space.
A3. Naturalistic urban open space use/activity sites.

It was hypothesized that students who had participated in the program would show a lower visual preference for outdoor scenes in the category of:

A4. Naturalistic urban open space use/activity sites with visible signs of human misuse or alteration.

QUESTIONNAIRE SURVEY HYPOTHESES -- Students who participated in the environmental design program would show a greater awareness of responsibility for:

B1. The quality and condition of urban open spaces.
B2. Individual decisions affecting environmental quality.
B3. Increasing individual and group knowledge of urban open spaces through environmental education.

Research hypotheses were determined by analyzing the lecture presentation notes and the environmental design program materials. A study of the subject contents identified areas of focus. Hypotheses reflect the relationships between this material and the background studies as reviewed in Chapter II.

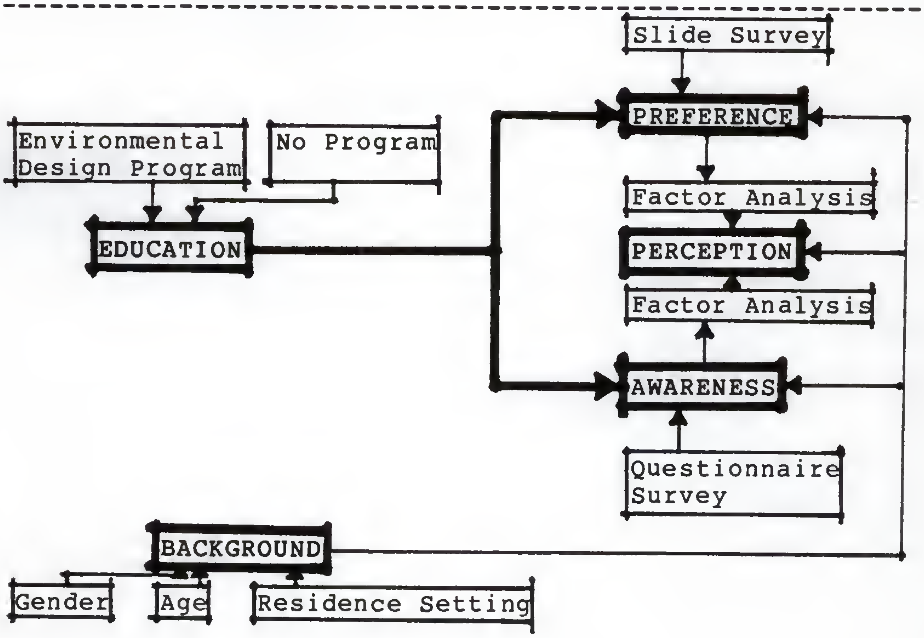
RESEARCH DESIGN

The research design which was employed in this study involved the measurement of constructs. A construct is defined as an idea or image resulting from an arrangement of facts and impressions (Campbell and Stanley 1963). Constructs in this study are the concepts of "education", "preference", "awareness", and "perception".

Descriptive measures can be determined which have direct relationships to these constructs. The survey instrument used in this study provides links and measurements of construct concepts. These instruments allow the measurement of factors which reflect preference, awareness, and perception.

The effect of education and background constructs, upon preference and awareness, make up the central focus of this research study. By using the slide and questionnaire surveys to gather data on preference and awareness, quantitative analysis can be done which shows identifiable links between constructs. The statistical procedure of factor analysis was used to determine the perception construct. These links and measurements are illustrated in graphic form (Figure 3.1).

Figure 3.1 Research Design



SLIDE SURVEY DEVELOPMENT

The survey instrument used for landscape preference data collection utilized color slide photography (Appendix A). Studies have shown that the use of slide evaluation techniques are a workable method for measuring sixth-grade children's environmental attitudes (Benjamin, Moeller, and Morrison 1977). Color photography has also been shown to be an acceptable method for representation of landscapes in preference studies (Shafer and Richards 1974, Zube et al. 1974, and R. Kaplan 1977 as cited by Miller 1984; Daniel and Boster 1976). Color slide scenes were chosen to provide controled and uniform images for presentation to classroom units of sixteen to thirty students.

A 35mm camera, fitted with a 35mm wide angle lens, was used to photograph all scenes. Wide-angle photography allows a larger segment of the landscape to be included within each frame, and conforms most nearly to the normal angle of vision. This format, combined with slide projection, produces a large photographic image which best approximates actual field experience (Nassauer 1983).

Photos used in and for the slide survey were taken within the city limits of Manhattan, Abilene, and Salina, Kansas. Slide content included public parks, recreation facilities, school playgrounds, college campus grounds, and downtown urban areas. All photos were taken from mid-morning to mid-afternoon to prevent any possible bias due to extremes in shadow contrasts with shade/sun scenes.

An initial pool of 120 35mm color slides was taken for this study. Using criteria employed by Kaplan, (1975) the sample was reduced by eliminating scenes of poor photographic quality, scenes dominated by buildings, pavement, and cultural features, scenes with people, and scenes which contained elements of possible personal bias such as wildlife or flowers. This pool was reduced to a representative sample of thirty-four slide scenes of which two were chosen as demonstration/practice slides.

Seasonal variation in scenes was controlled by taking all slides within a two-week time period in early October. All scenes were photographed before the infusion of fall color to prevent any bias which this seasonal change could produce.

Slide scenes were examined and sorted into four groups of eight slides each representing the four categories A1, A2, A3, and A4 as described in the research hypotheses. Examples of actual slides used are included in Appendix A. Each category of slide scene is identified and included in Appendix B.

QUESTIONNAIRE SURVEY DEVELOPMENT

A written survey questionnaire (Appendix C) was developed to collect data measuring students' awareness of responsibility towards the urban open-space environment. An initial item pool of 45 statements was prepared. Statements were written in a format similiar to that used in several Likert-type questionnaires (Millward 1975, Horvat and Voelker 1976).

The Likert scale is one of the most frequently used scales in the measurement of attitudes and perceptions (Moore 1983). Using this scale allows the assignment of numerical values to each response category. This provides quantitative scoring which can be collected and analyzed using statistical methods. Likert scales have been shown to accurately measure individuals' environmental feelings (Kaplan R. 1977) and environmental values (Sarnowski 1975).

This format enabled the researcher to use a closed question system in which the respondents are offered a choice of alternative replies. The closed system is easier and quicker to answer, requires no writing, and provides a means of data quantification (Oppenheim 1966).

The statement item pool contained subject matter which was compiled and edited from several informational sources. Statement content was a result of modification of similiar subject questionnaires (Horvat and Voelker 1976), discussions with personnel in the Kansas State University Department of Planning and Evaluation Services, and a study of the lecture notes used in the presentation of the environmental design education program.

To guarantee evaluation quality and accuracy the item pool was screened and analyzed using the criteria developed in a process for designing Likert-type scales (Koballa 1984).

1. Authoritative statements were avoided.
2. Double negatives were not used.
3. Univerals such as "never", "none", and "always" were not used.
4. The length of each statement was kept below 20 words to avoid respondent fatigue or confusion.
5. Statements using compound or complex sentences were avoided.

Content validity was accomplished through item analysis and screening. Educators in the departments of Curriculm and Instruction, Planning and Evaluation, and Landscape Architecture at Kansas State University scrutinized test items for clarity and uniformity of meaning, sentence legibility, and comprehensibility of statement content by students at the sixth-grade level.

Field testing of the 30-item test pool was conducted with thirty-three sixth-grade students from the Riley, Kansas, school system. The reduction of the inital 30-item test pool down to the final 22-item pool was accomplished by observing the pre-test participants and noting which items presented problems in clarity or comprehension. Items were also rejected which had similar or redundant subject matter or which did not have the appropriate subject content.

These twenty-two statements, along with one demonstration/practice statement, are presented in Appendix C. Initial breakdown of test items into the test measurement of categories B1, B2, and B3 of the questionnaire hypotheses are listed in Appendix D.

RATING SCALE DESIGN

Measurements of respondents' feelings in the slide preference survey and the questionnaire survey were obtained by using a five-point Likert scale. Five-point scales have been shown to be effective and appropriate for grade levels fourth (age 9 years) and above (Bunting and Cousins 1985).

This rating scale has also been used in environmental perception studies involving the use of slide presentations. It has been shown to be a consistent rating measure in environmental research and assessment studies (Schroeder 1984).

A five-point scale allows respondents the option of a neutral category to reduce the possible error of central tendency (Oppenheim 1966). This lessens participant fears about the extreme catagories and provides a midpoint between favorable and unfavorable responses.

Descriptive labels were assigned to each of the five categories on the survey answer forms. Wording was carefully considered on both slide and questionnaire scales. Input on wording from elementary teachers and principals was utilized in compiling the final format.

The final section included in the test instrument surveyed students' backgrounds (Appendix E). This form was developed to provide information on possible correlates between children's sex, age, residence setting, and environmental response. Previous research has suggested that these factors may have important effects on children's responses (Bunting and Cousins 1985, Horvat and Voelker 1976). The background survey form is also used to collect information on specific activities which may provide additional background on individual response patterns.

SURVEY PRESENTATION PROCEDURE

Participants were chosen from sixth-grade classroom units in Salina, Kansas. Three schools were surveyed which had participated in the program of environmental design education. The total number of students who participated in this test group totaled sixty-two. The control group of students were from two schools (three classroom units) which had not participated in the environmental design program. The number of students surveyed in the control group totaled eighty-five. Individual schools, classroom units, and number of students are listed in Figure 3.2.

Figure 3.2 School/Classroom Units

Environmental Design Program Participants	Classroom Units and Number of Students per Unit
Gleniffer Hill School	One class - 21 students
Lowell School	One class - 26 students
Oakdale School	One class - 15 students
	Total Test Number = 62 students

Non-Program Participants	Classroom Units and Number of Students
Sunset School	One class - 26 students
Stewart School	One class - 29 students
	One class - 30 students
	Total Test Number = 85 students

Classroom units participated in the study on December 8-9, 1986. The actual survey was done within the home room of each class and school. Survey procedures were standardized to limit threats to validity. A standardized set of instructions was read to the student participants which gave a brief description of the procedures and human subjects consent information. (Appendix F) The classroom teacher was present in all cases and participants were instructed to ask for individual help when they encountered a problem in reading or interpreting a test item. Administration of the survey required a maximum of 25 minutes in order to overcome problems relative to the attention span of children of this age.

Two demonstration/practice slides were shown along with a reading and explanation of the answers on the slide survey form. Slide scenes were not identified or described nor was mention made of the particular locality in which the slides were taken.

The test slides were shown at 15 second intervals. Participants checked one mark beside the answer which best described their preference for each slide scene. The rating sheet contained thirty-six response scales, of which thirty-two were actually used in the slide presentation.

Extra rating scales were placed on the form to lessen any rating "end-effect" caused by tired viewers (Miller 1984).

The author conducted the timed sequence of slides and called the number of each slide scene as it appeared, to lessen the chance of mismatched responses. As an added precaution, all answer forms were color coded for ease in administering the survey and to aid students. Each of the three parts of the survey were color coded as follows: Yellow for Slide, Blue for Questionnaire, and Green for Background information.

At the conclusion of the slide survey presentation, participants received directions and a practice statement for clarification of survey procedures. Participants were not given time constraints on completing this section of the survey, the classes as a whole finished the questionnaire within 10 minutes.

The background survey form was the last part of the test instrument to be completed by the student participants. The classroom teacher and the researcher were available to assist students in completing this form.

STATISTICAL ANALYSES

All data were coded and entered into a Harris system which is used by the Statistics Department at Kansas State University. The statistical package used in data analysis was the SAS (Statistical Analysis System). This system was used to calculate the following:

1) The mean and standard deviation rating scores of the control and test groups on each slide (1-32, landscape preference) and question (1-22, environmental awareness).

2) The differences in ratings between control and test groups with a probability of $p<.05$ being set as the level of significance.

3) A rating for each background variable with respect to each slide and question.

4) A chi-square test score for determination of levels of significance ($p<.05$) between background variables and slide and question scores.

5) Factor analysis and correlation coefficients for use in perception determination and examination.

CHAPTER IV
RESULTS

The results of this research study have been organized into three sections. The first section is a description of landscape preference and questionnaire scores which includes means, standard deviations, and probability values. This section contains data on preference and questionnaire ratings, correlations between background variables, and significant levels of difference. Section two organizes and presents factor analysis data which correlates all data into perceived groupings of test variables. These results are examined in order to ascertain specific perceptions which occur among and between participants. The final section compares and discusses the statistical results of this study in relation to the stated research hypotheses (Chapter 3).

Reliability for both the slide and questionnaire surveys was established using the Cronbach coefficient alpha of internal consistency. Reliability coefficients were calculated for both the slide survey and questionnaire instruments as a total, and for each item category within the stated the research hypotheses. These reliability coefficients are presented in Table 4.1. Results indicate that both instruments (in total) were reliable for the study population.

TABLE 4.1 RELIABILITY COEFFICIENTS - Slide and Questionnaire Survey Instruments

Scale	Coefficient Alpha	Number of Items
Total Slide Survey	0.86	32
Slide Category A1	0.60	8
Slide Category A2	0.83	8
Slide Category A3	0.74	8
Slide Category A4	0.66	8
Total Questionnaire Survey	0.82	22
Questionnaire Category B1	0.66	8
Questionnaire Category B2	0.71	9
Questionnaire Category B3	0.57	5

STATISTICAL RESULTS OF LANDSCAPE PREFERENCE SCORES

Rating scores on the slide preference survey were based on a continuous numerical scale of 1 to 5. High preference for a particular slide scene was equated to 1, while low preference was equated to 5. Means, as well as standard deviations and probabilities, were calculated for control (non-program participants) and test (environmental design program participants). A probability value of .05 was set as the level of significance to be used in determining possible significant differences between means.

The .05 level of significance has been typically used in educational research (Moore 1983) and has been chosen as the most practical in terms of this study.

A t-test comparing mean scores between control and test groups showed few significant statistical differences (Table 4.2, p. 51). Slide comparisons which did show a significant difference included slides 2, 8, 9, and 18. Differences in landscape preference between the two groups were not substantial enough to establish clear patterns or categories. The mean standard deviation of control (1.02) and test (1.06) groups showed high levels of agreement within their respective groups. Both groups thus contained an equal range and variability of responses from individuals within each group.

The test group gave slides 2, 8, and 9 higher ratings for visual preference as compared to the control group. The control group gave slide number 18 a higher rating of visual preference. Subject content of these four slides is given in Figure 4.1 on the following page.

Figure 4.1 Significant Slide Differences

TEST GROUP

Slide #2 - Brick courtyard located in large, open green space with stone benches, sculpture, and sidewalks.

Slide #8 - Green, open space with distant enclosure of large evergreen trees and some signs of litter.

Slide #9 - Enclosed natural space with bark trail and rustic wooden bench.

CONTROL GROUP

Slide #18 - Open gathering space with timber pole seating and concrete stepping stones.

An examination of these slides identifies elements for evaluation and comparison. The subject content of slide #2 is heavily design influenced, the combinations of urban features suggest an urban plaza and social space. The influence of the environmental design education program could have been a factor here in the identification of designed elements and spaces. Slides #8 and #9 pictured open, natural spaces without urban influence. Slide #9 contains a simple, rustic bench and a bark path which suggests a low impact use of a natural area. The test program could have influenced the higher preference shown for a designed natural open space. Slide #18, which the control group preferred, pictures a less visually attractive designed space. Design elements in this space do not create a harmonious visual effect.

TABLE 4.2 STATISTICAL SUMMARY - Rating Differences Between Control and Test Groups For Slide Preference Survey

Variable	Group	Mean	Standard Deviation	P<Value
Slide 1	Control	2.19	1.13	0.32
	Test	2.39	1.22	
Slide 2	Control	3.24	1.04	0.03 *
	Test	2.84	1.10	
Slide 3	Control	2.49	1.03	0.26
	Test	2.31	0.97	
Slide 4	Control	2.41	0.88	0.56
	Test	2.50	0.92	
Slide 5	Control	1.80	0.97	0.39
	Test	1.95	1.09	
Slide 6	Control	2.66	1.09	0.30
	Test	2.84	1.01	
Slide 7	Control	2.27	1.08	0.94
	Test	2.26	1.04	
Slide 8	Control	3.46	1.38	0.002 *
	Test	2.76	1.30	
Slide 9	Control	3.35	1.38	0.02 *
	Test	2.80	1.35	
Slide 10	Control	2.71	1.16	0.25
	Test	2.95	1.35	
Slide 11	Control	1.39	0.66	0.62
	Test	1.45	0.84	
Slide 12	Control	2.69	0.98	0.46
	Test	2.82	1.08	
Slide 13	Control	2.48	0.88	0.52
	Test	2.58	0.95	

* Denotes significant difference - Probability .05 or less

TABLE 4.2 Continued.

Variable	Group	Mean	Standard Deviation	P<Value
Slide 14	Control	2.99	1.19	0.92
	Test	2.97	1.16	
Slide 15	Control	2.13	0.99	0.31
	Test	2.31	1.08	
Slide 16	Control	3.07	1.08	0.77
	Test	3.02	1.12	
Slide 17	Control	1.98	0.94	0.26
	Test	2.16	1.01	
Slide 18	Control	1.67	0.76	0.04 *
	Test	1.98	0.94	
Slide 19	Control	2.28	1.16	0.77
	Test	2.34	1.17	
Slide 20	Control	2.95	0.95	0.93
	Test	2.97	1.07	
Slide 21	Control	1.81	0.99	0.74
	Test	1.76	0.92	
Slide 22	Control	3.31	1.18	0.61
	Test	3.40	1.12	
Slide 23	Control	2.06	0.78	0.13
	Test	2.29	0.98	
Slide 24	Control	3.41	1.02	0.25
	Test	3.20	1.06	
Slide 25	Control	1.50	0.73	0.07
	Test	1.77	0.95	
Slide 26	Control	3.27	1.15	0.95
	Test	3.26	1.17	
Slide 27	Control	2.18	0.89	0.49
	Test	2.29	1.05	

* Denotes significant difference - Probability .05 or less

TABLE 4.2 Continued.

Variable	Group	Mean	Standard Deviation	P<Value
Slide 28	Control	3.14	1.17	0.89
	Test	3.11	1.17	
Slide 29	Control	1.98	0.91	0.17
	Test	2.16	0.71	
Slide 30	Control	2.79	1.07	0.11
	Test	3.08	1.09	
Slide 31	Control	2.61	1.06	0.30
	Test	2.79	1.01	
Slide 32	Control	2.67	1.03	0.83
	Test	2.69	0.97	

* Denotes significant difference - Probability .05 or less

STATISTICAL RESULTS OF QUESTIONNAIRE SURVEY SCORES

Rating values were calculated (Table 4.3, pg. 55) also for control and test group means, standard deviation, and probability. Again, a 1 to 5 continuous numerical scale was utilized for data collection of questionnaire survey responses. A high level of agreement was equated to 1, while a low level of agreement equated to 5. A probability value of .05 was again used in determining levels of significant difference.

A comparison of mean scores for questions 1 through 22 produced one question (number 11) which measured a significant difference. A measurement of mean standard deviation showed similiar ranges of response between control (1.12) and test (1.08) groups. The two groups as a whole also gave each of five negatively worded statements a similiar low preference rating. Negatively worded statements occured in numbers 2, 4, 14, 20, and 22.

The test group showed a higher preference or agreement with statement #11. (Figure 4.2)

Figure 4.2 Significant Questionnaire Difference

Question #11 - If I saw someone misusing park equipment I would tell someone about it.

This question was aimed at measuring the individual responsibility each participant felt for environmental quality. The environmental design program participants showed a higher level of awareness for what they as individuals could do to improve their immediate environment.

TABLE 4.3 STATISTICAL SUMMARY - Rating Differences Between Control and Test Groups For Questionnaire Survey

Variable	Group	Mean	Standard Deviation	P<Value
Question 1	Control	2.08	1.18	0.25
	Test	1.87	1.05	
Question 2	Control	3.69	1.08	0.71
	Test	3.63	1.01	
Question 3	Control	2.45	0.99	0.30
	Test	2.27	0.98	
Question 4	Control	2.68	1.27	0.96
	Test	2.69	1.18	
Question 5	Control	2.80	1.29	0.23
	Test	2.55	1.21	
Question 6	Control	2.11	1.14	0.45
	Test	1.97	1.06	
Question 7	Control	2.47	1.17	0.88
	Test	2.50	1.17	
Question 8	Control	2.15	1.21	0.84
	Test	2.19	1.25	
Question 9	Control	2.22	1.05	0.28
	Test	2.05	0.89	
Question 10	Control	2.06	0.85	0.14
	Test	2.29	0.98	
Question 11	Control	2.82	0.97	0.04 *
	Test	2.47	1.04	
Question 12	Control	2.75	1.34	0.85
	Test	2.71	1.34	
Question 13	Control	1.92	0.78	0.92
	Test	1.90	1.00	

* Denotes significant difference - Probability .05 or less

TABLE 4.3 Continued.

Variable	Group	Mean	Standard Deviation	P<Value
Question 14	Control	3.65	1.24	0.95
	Test	3.66	1.28	
Question 15	Control	2.99	0.94	0.52
	Test	2.89	0.94	
Question 16	Control	2.20	1.15	0.82
	Test	2.24	1.10	
Question 17	Control	1.91	0.77	0.71
	Test	1.95	0.71	
Question 18	Control	2.15	0.92	0.88
	Test	2.12	1.02	
Question 19	Control	2.14	0.94	0.32
	Test	1.98	0.93	
Question 20	Control	3.33	1.30	0.34
	Test	3.11	1.40	
Question 21	Control	1.86	0.79	0.83
	Test	1.89	0.81	
Question 22	Control	3.07	1.34	0.39
	Test	2.87	1.42	

* Denotes significant difference - Probability .05 or less

SIGNIFICANT RATING DIFFERENCES

The results of statistical analysis presented in Table 4.2 and 4.3 indicate that significant differences existed between control and test groups with regard to slides numbered 2, 8, 9, 18, and questionnaire number 11. These five items were further analyzed by comparing response scores with individual background variables (Table 4.4).

Background variables were collected by student imput on the survey instrument. Variables for study were determined by examining previous research (Bunting and Cousins 1985, Horvat and Voelker 1976). These have been identified as; sex, age, and residence setting. Specific variables which could influence participant responses in the Salina area were participation in Scouts, Audubon, school field trips, and 4-H. The last variable to be included pertained to parks; time spent by participants in this setting and the relative distance lived from this setting.

Participation in outdoor-oriented organizations and programs provides children with both exposure to and knowledge of the natural environment. Parks provide children with open space and natural areas which influence activity choices. Background variables which were examined are listed below:

Sex
Large City
Small City
Small Town
Country
Farm

Scouts
Audubon
School Field Trips
4-H
Proximity to Parks
Time in Parks

TABLE 4.4 BACKGROUND VARIABLES - Correlation Coefficients

Slide 2

Background Variable	P<Value	Background Variable	P<Value
Sex	0.26	Scouts	0.40
Large City	0.12	Audubon	0.24
Small City	0.57	School Field Trips	0.33
Small Town	0.40	4-H	0.36
Country	0.48	Proximity to Parks	0.67
Farm	0.27	Time in Parks	0.31

Slide 8

Background Variable	P<Value	Background Variable	P<Value
Sex	0.10	Scouts	0.55
Large City	0.31	Audubon	0.80
Small City	0.86	School Field Trips	0.66
Small Town	0.07	4-H	0.70
Country	0.66	Proximity to Parks	0.77
Farm	0.53	Time in Parks	0.42

Slide 9

Background Variable	P<Value	Background Variable	P<Value
Sex	0.31	Scouts	0.05 *
Large City	0.53	Audubon	0.84
Small City	0.03 *	School Field Trips	0.17
Small Town	0.59	4-H	0.95
Country	0.81	Proximity to Parks	0.35
Farm	0.64	Time in Parks	0.32

* Denotes significant difference - Probability .05 or less

TABLE 4.4 Continued.

Slide 18

Background Variable	P<Value	Background Variable	P<Value
Sex	0.40	Scouts	0.84
Large City	0.30	Audubon	0.74
Small City	0.34	School Field Trips	0.89
Small Town	0.71	4-H	0.91
Country	0.03 *	Proximity to Parks	0.43
Farm	0.13	Time in Parks	0.49

Question 11

Background Variable	P<Value	Background Variable	P<Value
Sex	0.05 *	Scouts	0.31
Large City	0.11	Audubon	0.24
Small City	0.85	School Field Trips	0.34
Small Town	0.22	4-H	0.82
Country	0.35	Proximity to Parks	0.65
Farm	0.56	Time in Parks	0.91

* Denotes significant difference - Probability .05 or less

A chi-square test was used to determine the figures found in Table 4.4. This test shows that for slide #9 students who were from small cities responded with a higher preference. Also for slide #9, students who had participated in scouting gave a higher preference than those who had not participated. Students who said they had lived in the country showed a higher preference for slide #18. On question #11, boys showed higher preference due, in part, to a high percentage of "not sure" responses on the part of girls. The results of this test do not offer substantial statistical conclusions on the effects of background variables on student preference. Influences of sex, residence setting, and scouting on preference were shown to have a slight effect.

FACTOR ANALYSIS RESULTS

The following tables (4.5 - 4.8) present statistical results which were obtained through factor analysis of all control and test group scores. Factor analysis is used to determine possible groupings or clusters of test slides or questions. Test items are isolated into groups which participants have perceived to be similar. Correlation coefficients of 0.4 or -0.4 and above have been set as the significant levels for analysis. This figure has been identified as a universally accepted value in perceptual research.

The factor analysis results identified two separate factors or groupings of test responses for both slide and questionnaire surveys (Tables 4.5 - 4.8). Variables with a rating of approximately 0.4 and above have been starred. Those variables which scored at the designated significance level for both items have been identified with a D which designates a double-loaded item. Double-loaded variables indicate that the particular item was identified as belonging to both factor groups.

Two methods of factor analysis were used to correlate student responses. The procedure factor method was used to correlate all slide and question test items and produced two factor groupings. The results of this analysis are presented in Tables 4.5 and 4.7. The orthogonal transformation matrix method of factor analysis was also used as a means of comparison and reference. This method also produced two identifiable factor groupings which are shown in Tables 4.6 and 4.8.

The identified factor items (those scoring at approximately 0.400 and above) which were not double-loaded were cross referenced between control and test groups. Slide and questionnaire items which were unique to factor 1 and factor 2 categories within control and test groups have been identified at the bottom of Tables 4.5 - 4.8. Items are identified which occur only within respective groups.

Analysis of these slide items which were specific to control and test groups did not show conclusive evidence of quantifiable differences. Both methods of factor analysis produced similiar although variable groupings of specific items. A comparison of slides specific to factor 2 within the test group did, however, show the inclusion of natural open space scenes with visible trails (procedure factor method). This would be consistent with previous findings of this study that show the environmental design participants displayed a higher preference for design/use within open space areas.

A comparison of specific questionnaire factor items (Tables 4.7 and 4.8) again did not provide a consistent or conclusive measure of difference. Using the procedure factor method produced a definite grouping of negative questionnaire items on factor 2 within the test group. Three of four items grouped within factor 2 made reference to limits on the amounts of natural areas and wildlife and to a lowered interest in nature in general. Control group participants perceived two of these negative items as part of factor 1 or double loaded into both factor groups.

The test group was shown to have identified four items in the factor 1 category which directly pertain to individual environmental responsibility. These specific items, made a direct statement about what an individual (first person singular) could or would do to improve environmental standards. This would indicate that students who had been exposed to environmental education were more aware of what they could and would do in these situations.

TABLE 4.5 FACTOR ANALYSIS - Comparison of Slide Scores Using Procedure Factor Method

	CONTROL GROUP			TEST GROUP		
Variable	Factor 1		Factor 2	Factor 1		Factor 2
Slide 1	0.185		*0.544	0.139		*0.573
Slide 2	*0.513		-0.295	*0.568		-0.363
Slide 3	0.180		*0.467	0.220		*0.486
Slide 4	0.177		*0.522	0.205		*0.473
Slide 5	*0.535		-0.341	*0.432		-0.080
Slide 6	*0.547		-0.284	*0.474		-0.345
Slide 7	0.349		-0.007	*0.463		0.269
Slide 8	0.134		*0.529	0.131		*0.600
Slide 9	0.160		*0.513	0.066		*0.639
Slide 10	0.470	D	-0.557	0.596	D	-0.568
Slide 11	0.344		*0.419	0.073		*0.591
Slide 12	*0.484		-0.158	*0.629		-0.257
Slide 13	*0.599		-0.184	0.380		0.239
Slide 14	*0.552		-0.332	0.539	D	-0.452
Slide 15	0.445	D	0.551	0.281		*0.663
Slide 16	*0.495		-0.065	*0.526		-0.071
Slide 17	*0.451		-0.372	*0.494		-0.146
Slide 18	*0.476		-0.127	*0.565		0.044
Slide 19	0.212		*0.681	0.237		*0.427
Slide 20	*0.527		0.135	*0.399		0.216
Slide 21	0.402	D	0.519	-0.115		*0.607
Slide 22	*0.490		-0.281	*0.643		-0.267
Slide 23	*0.463		0.301	0.513	D	0.468
Slide 24	*0.568		0.210	*0.508		0.248
Slide 25	*0.440		0.150	*0.567		0.210
Slide 26	0.373		-0.370	0.563	D	-0.430
Slide 27	*0.626		0.270	0.550	D	0.393
Slide 28	*0.473		-0.044	0.348		0.112
Slide 29	*0.658		0.020	*0.524		0.148
Slide 30	0.503	D	-0.454	*0.641		-0.329
Slide 31	*0.520		0.059	*0.750		0.027
Slide 32	*0.556		0.228	0.141		0.360

Identified Test Variables Specific To Control and Test Groups

Factor 1	Factor 2	Factor 1	Factor 2
13,14,23, 27,28,32	None	7,30	15,21

TABLE 4.6 FACTOR ANALYSIS - Comparison of Slide Scores Using Orthogonal Transformation Matrix

	CONTROL GROUP		TEST GROUP	
Variable	Factor 1	Factor 2	Factor 1	Factor 2
Slide 1	-0.089	*0.567	-0.098	*0.580
Slide 2	*0.591	-0.023	*0.665	-0.109
Slide 3	-0.058	*0.497	0.011	*0.533
Slide 4	-0.086	*0.544	0.003	*0.515
Slide 5	*0.632	-0.053	*0.429	-0.097
Slide 6	*0.616	-0.003	*0.572	-0.131
Slide 7	0.312	-0.156	0.320	*0.430
Slide 8	0.127	*0.531	-0.115	*0.603
Slide 9	0.096	*0.529	-0.190	*0.614
Slide 10	*0.675	-0.275	*0.771	-0.287
Slide 11	0.110	*0.531	-0.166	*0.572
Slide 12	*0.502	-0.085	*0.680	-0.011
Slide 13	*0.616	-0.115	0.256	0.369
Slide 14	*0.643	-0.038	*0.673	-0.203
Slide 15	0.138	*0.695	-0.002	*0.720
Slide 16	*0.469	-0.172	*0.512	-0.142
Slide 17	*0.572	-0.120	*0.511	-0.060
Slide 18	*0.480	0.109	*0.502	0.263
Slide 19	-0.129	*0.701	0.050	*0.486
Slide 20	*0.404	0.364	0.281	0.356
Slide 21	0.115	*0.646	-0.344	*0.512
Slide 22	*0.564	-0.021	*0.696	-0.008
Slide 23	0.270	*0.482	0.287	*0.632
Slide 24	0.405	D 0.450	0.369	*0.428
Slide 25	0.320	0.338	0.438	D 0.417
Slide 26	*0.502	-0.154	*0.686	-0.173
Slide 27	0.429	D 0.530	0.351	*0.578
Slide 28	*0.439	-0.181	0.276	0.240
Slide 29	*0.573	0.324	*0.423	0.341
Slide 30	*0.656	-0.168	*0.718	-0.050
Slide 31	*0.433	0.294	*0.678	0.320
Slide 32	0.386	*0.460	-0.012	0.386

Identified Test Variables Specific To Control and Test Groups

Factor 1	Factor 2	Factor 1	Factor 2
13,20,28	32	17	7,24,27

TABLE 4.7 FACTOR ANALYSIS - Comparison of Questionnaire Scores Using Procedure Factor Pattern

	CONTROL GROUP		TEST GROUP	
Variable	Factor 1	Factor 2	Factor 1	Factor 2
Ques 1	0.476 D	0.395	*0.611	0.317
Ques 2	-0.189	-0.221	-0.373	0.328
Ques 3	0.380	-0.221	*0.557	-0.278
Ques 4	-0.281	*0.701	0.260	*0.588
Ques 5	0.151	-0.017	0.200	-0.137
Ques 6	*0.553	0.148	*0.625	0.376
Ques 7	*0.600	0.021	0.515 D	-0.418
Ques 8	*0.470	-0.290	*0.480	0.064
Ques 9	0.235	*-0.396	0.315	*0.473
Ques 10	*0.443	0.348	*0.722	0.093
Ques 11	0.340	0.058	*0.687	0.129
Ques 12	*0.549	-0.056	*0.527	-0.272
Ques 13	*0.486	0.235	*0.635	-0.067
Ques 14	*-0.622	0.071	-0.252	*0.595
Ques 15	0.292	-0.060	*0.640	0.265
Ques 16	*0.584	-0.260	*0.390	-0.252
Ques 17	*0.516	0.308	*0.539	0.199
Ques 18	*0.453	0.348	*0.645	0.135
Ques 19	*0.778	0.002	*0.701	0.228
Ques 20	-0.333	-0.183	0.044	0.212
Ques 21	*0.630	0.068	*0.653	-0.188
Ques 22	-0.504 D	0.549	-0.125	*0.538

Identified Test Variables Specific To Control and Test Groups

Factor 1	Factor 2	Factor 1	Factor 2
7,14	None	1,3,11,15	14,22

TABLE 4.8 FACTOR ANALYSIS - Comparison of Questionnaire Scores Using Orthogonal Transformation Matrix

	CONTROL GROUP		TEST GROUP	
Variable	Factor 1	Factor 2	Factor 1	Factor 2
Ques 1	*0.618	-0.011	*0.688	-0.009
Ques 2	-0.288	-0.045	-0.174	*0.466
Ques 3	0.145	*-0.415	0.360	*-0.508
Ques 4	0.243	*0.715	0.049	*0.641
Ques 5	0.103	-0.111	0.111	-0.215
Ques 6	*0.516	-0.248	*0.729	0.036
Ques 7	*0.469	-0.375	0.256	*-0.612
Ques 8	0.167	*-0.527	*0.453	-0.170
Ques 9	-0.080	*-0.454	*0.501	0.268
Ques 10	*0.563	-0.024	*0.680	-0.260
Ques 11	0.295	-0.177	*0.667	-0.211
Ques 12	0.380	*-0.400	0.336	*-0.489
Ques 13	*0.521	-0.138	*0.528	-0.359
Ques 14	-0.426	D 0.460	0.060	*0.643
Ques 15	0.183	-0.235	*0.690	-0.070
Ques 16	0.274	*-0.577	0.225	*-0.406
Ques 17	*0.592	-0.102	*0.570	-0.079
Ques 18	*0.570	-0.031	*0.632	-0.186
Ques 19	0.592	D -0.505	*0.725	-0.130
Ques 20	-0.372	0.078	0.139	0.166
Ques 21	*0.522	-0.360	0.486	D -0.475
Ques 22	-0.025	*0.745	0.144	*0.533

Identified Test Variables Specific To Control and Test Groups

Factor 1	Factor 2	Factor 1	Factor 2
7,21	8,9	8,9,11,15,19	2,7,14

NUMERICAL ORDERING OF SIGNIFICANT VARIABLES

The final method of examining factor analysis results consisted of a numerical ordering of variable items identified as factors 1 and 2. Factor groupings obtained from the procedure factor method were chosen for study due to consistency and informative detail. Items were listed according to the order of loading obtained from the previous factor analysis (Tables 4.5 and 4.7) and are listed in Tables 4.10, 4.11, and 4.12.

A study of factor 1 groupings revealed the occurence of many of the same slide scenes within both control and test groups. A trend did emerge in that slides ordered high in the control group were ordered low in the test group. This reversal in ordering was evident also with high ordered items in the test group being found lower in the control group.

Within the test group, factor 1 items which scored high as a perceived grouping included many with designed urban spaces. The slides of more natural open spaces were scored lower in the grouping. These same scenes were placed in the opposite order within the factor 1 grouping for the control group. Similiar results were observed within the factor 2 groupings with the perceived orders again generally opposite. This numerical ordering establishes a pattern of perception in which the test group rated scenes of designed features within urban spaces and natural areas at a higher level of preference than did the control. This increased preference for environmental design in the test group could be the result of the education program which stressed the elements and principles of design.

Numerical ordering of perceived factors with questionnaire variables (Tables 4.10, 4.11, and 4.12) reiterated earlier trends as questionnaire items were generally reversed. In factor 1 variables, items specific to the test group included ones pertaining to individual action (Questions 1,3,11,15). This bears out earlier findings that the test group displayed a higher awareness of individual environmental responsibility.

One item specific to the factor 1 category in the control group (Question 14) was a negatively worded question. This would indicate a lower interest in nature or a misunderstanding of the question. The factor 2 groupings for both control and test groups contained predominantly negative statements. The test group included two additional items, one of which the control group had perceived in the factor 2 group. The content of these two additional items would indicate that the test group had an increased awareness of natural elements (Table 4.12).

TABLE 4.9 FACTOR ANALYSIS - Numerical Ordering of Significant Slide Variables From Procedure Factor Method

CONTROL GROUP		TEST GROUP	
Variable	Factor 1	Variable	Factor 1
Slide 29	0.658	Slide 31	0.750
Slide 27*	0.626	Slide 22	0.643
Slide 13*	0.599	Slide 30*	0.641
Slide 24	0.568	Slide 12	0.629
Slide 32*	0.556	Slide 2	0.568
Slide 14*	0.552	Slide 25	0.567
Slide 6	0.547	Slide 18	0.565
Slide 5	0.535	Slide 16	0.526
Slide 20	0.527	Slide 29	0.524
Slide 31	0.520	Slide 24	0.508
Slide 2	0.513	Slide 17	0.494
Slide 16	0.495	Slide 6	0.474
Slide 22	0.490	Slide 7 *	0.463
Slide 12	0.484	Slide 5	0.432
Slide 18	0.476	Slide 20*	0.399
Slide 28*	0.473		
Slide 23*	0.463		
Slide 17	0.451		
Slide 25	0.440		

* Denotes slide variable specific to included group

CONTROL GROUP		TEST GROUP	
Variable	Factor 2	Variable	Factor 2
Slide 19	0.681	Slide 15*	0.663
Slide 1	0.544	Slide 9	0.639
Slide 8	0.529	Slide 21*	0.607
Slide 4	0.522	Slide 8	0.600
Slide 9	0.513	Slide 11	0.591
Slide 3	0.467	Slide 1	0.573
Slide 11	0.419	Slide 3	0.486
		Slide 4	0.473
		Slide 19	0.427

* Denotes slide variable specific to included group

TABLE 4.10 FACTOR ANALYSIS - Numerical Ordering of Significant Questionnaire Variables From Procedure Factor Method

CONTROL GROUP Variable	Factor 1	TEST GROUP Variable	Factor 1
Ques 19	0.778	Ques 10	0.722
Ques 21	0.630	Ques 19	0.701
Ques 14*	0.622	Ques 11*	0.687
Ques 7 *	0.600	Ques 21	0.653
Ques 16	0.584	Ques 18	0.645
Ques 6	0.553	Ques 15*	0.640
Ques 12	0.549	Ques 13	0.635
Ques 17	0.516	Ques 6	0.625
Ques 13	0.486	Ques 1 *	0.611
Ques 8	0.470	Ques 3 *	0.557
Ques 18	0.453	Ques 17	0.539
Ques 10	0.443	Ques 12	0.527
		Ques 8	0.480
		Ques 16	0.390

* Denotes questionnaire variable specific to included group

CONTROL GROUP Variable	Factor 2	TEST GROUP Variable	Factor 2
Ques 4	0.701	Ques 14*	0.595
Ques 9	0.396	Ques 4	0.588
		Ques 22*	0.538
		Ques 9	0.473

*Denotes questionnaire variable specific to included group

TABLE 4.11 Factor 1 - Survey Questions In Order of Procedure Method Factor Analysis Rating Scores

CONTROL GROUP

Correlation Coefficient	Question
0.778	19. I care about the condition of the parks and playgrounds in my area.
0.630	20. We should be concerned about the ways our parks and open spaces look.
0.622	14. I have more interesting things to do than learn about nature.
0.600	7. We should learn more about the outdoors in our school.
0.584	16. I think we should have more trees and plants in our parks and playground areas.
0.553	6. People who leave their pop cans and picnic litter on the ground make me angry
0.549	12. I would like to learn how parks and schoolgrounds are designed and built.
0.516	17. Parents and teachers can show kids ways to help keep parks and open spaces nicer to look at and use.
0.486	13. We can help take care of our parks by suggesting improvements to the people who take care of them.
0.470	8. Walking downtown is more fun when there are trees along the street.
0.453	18. We should worry about problems in the parks and city open spaces in our town.
0.443	10. I can do something to make schoolgrounds and parks nicer to look at.

TABLE 4.11 Continued.

TEST GROUP

Correlation Coefficient	Question
0.722	10. I can do something to make schoolgrounds and parks nicer to look at.
0.701	19. I care about the condition of the parks and playgrounds in my area.
0.687	11. If I saw someone misusing park equipment I would tell someone about it.
0.653	21. We should be concerned about the ways our parks and open spaces look.
0.645	18. We should worry about problems in the parks and city open spaces in our town.
0.640	15. I think there are a lot of problems related to parks and open spaces that I can help solve.
0.635	13. We can help take care of our parks by suggesting improvements to the people who take care of them.
0.625	6. People who leave their pop cans and picnic litter on the ground make me angry.
0.611	1. I feel bad when I see someone breaking or marking on trees and plants in parks and open spaces.
0.557	3. If I disagree with something that happens in my city, I should tell someone about it.
0.539	17. Parents and teachers can show kids ways to help keep parks and open spaces nicer to look at and use.
0.527	12. I would like to learn how parks and schoolgrounds are designed and built.

TABLE 4.11 Continued

TEST GROUP

Correlation Coefficient	Question
0.480	8. Walking downtown is more fun when there are trees along the street.
0.390	16. I think we should have more trees and plants in our parks and playground areas.

TABLE 4.12 Factor 2 - Survey Questions In Order of Procedure Method Factor Analysis Rating Scores

CONTROL GROUP

Correlation Coefficient	Question
0.701	4. We have enough park areas for people to use in our city.
0.396	9. Sometimes people harm our parks and open spaces because no one tries to stop them.

TEST GROUP

Correlation Coefficient	Question
0.595	14. I have more interesting things to do than learn about nature.
0.588	4. We have enough park areas for people to use in our city.
0.538	22. There are enough trees and bushes in our parks for birds and animals to live in.
0.473	9. Sometimes people harm our parks and open spaces because no one tries to stop them.

COMPARISON OF STATISTICAL RESULTS WITH RESEARCH HYPOTHESES

The measurement and analysis of data in this study produced results which can be compared with the research hypotheses as stated in Chapter Three.

SLIDE HYPOTHESES

It was hypothesized that students who participated in the environmental design education program would show a higher visual preference for scenes in three categories (A1, A2, and A3). These categories were defined and listed in Appendix B. It was also hypothesized that students who had participated in the program would show a lower preference for scenes in one category (A4). Slide categories defined were as follows:

A1. Naturalistic urban open space.
A2. Human altered-influenced urban open space.
A3. Naturalistic urban open space use/activity sites.
A4. Naturalistic urban open space use/activity sites with visible signs of human misuse or alteration.

Mean preference ratings did not show a significant difference between groups in regard to slide scenes. Significant differences were found on four slides which suggested a trend for the test group to exhibit a higher preference for slides in categories A2 and A3. Factor analysis and numerical ordering of perceived factors also pointed to trends which substantiate a higher preference and awareness of elements in A2 and A3 by the test group.

Possible reasons for differences in actual results as compared to hypotheses can be identified. Signs of litter and environmental damage (A4 category) may not have been noticed by students as little change in preference was observed for either control or test groups. Also, a tendency may have occured for students to give positive ratings to all slides regardless of details in scenes. The subject content (outdoors, parks, playgrounds, etc.) could also be seen in a positive way by participants.

Factor analysis of the slide survey data produced two identifiable categories of similiarly perceived scenes. Factor 1 groupings contained predominantly urban and high use/activity sites. Factor 2 groupings contained more natural, less altered sites. These findings would point to a more general, less detailed visual analysis by the participants in this study.

QUESTIONNAIRE HYPOTHESES

It was hypothesized that students who participated in the environmental design program would show a greater awareness of responsibility for items in the categories of:

B1. The quality and condition of urban open spaces.
B2. Individual decisions affecting environmental quality.
B3. Increasing individual and group knowledge of urban open spaces through environmental education.

Mean preference ratings did not show a significant difference between control and test groups in regard to the three categories of the research hypotheses. One question (#11) was rated higher by the test group. This question was included in the B2 category (Appendix D) and pertains to individual control and responsibility for environmental quality.

As an additional analysis, preference scores were totaled and averaged with regard to each of the three hypotheses categories. A slight trend for higher preference was shown to exist in category B2 for the test group (2.28) as compared to the control group (2.39).

Factor analysis and numerical ordering also provided additional information which substantiates the above trend. The test group identified three items which refer to category B2 as described above. Inferential conclusions would confirm that the test group did, in fact, show a greater awareness of items found in category B2. Statistical analysis did not, however, show significant differences in participant ratings in hypotheses categories of B1 and B3.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

The purposes of this research were to focus on the following major issues:

1) the development of measurement instruments with application to a specific program and specific population;

2) the testing of the developed instruments in the collection of quantifiable data for the analysis of:

A. Environmental Preference - Slide Survey
B. Environmental Awareness - Questionnaire Survey
C. Environmental Perception - Slide Survey and Questionnaire Survey;

3) the statistical analysis of test data for use in comparison of program and non-program student ratings;

4) the evaluation of possible changes in environmental preference, awareness, and perception in program students as a result of participation in an environmental design education program;

5) the examination of overall study results to determine the successes and/or limitations of the evaluation techniques and procedures;

6) the development of research recommendations and study summary.

This chapter analyzes and interprets the findings of this study and discusses the results in regard to the major research issues as stated.

1. INSTRUMENT DEVELOPMENT

The basis for the test instrument development was a combination of techniques utilized by professionals in many different fields. The theoretical definitions of this development were based on the work of environmental educators, landscape architects, behavioral scientists, geographers, and environmental psychologists. The test instrument as presented was seen to work smoothly in the context of the elementary school situation with the student population tested. Tests for statistical reliability established a range of coefficient alpha values between 0.57 and 0.86 which show a high degree of internal consistency.

Limitations of the slide instrument as tested may lie with student's prior exposure and attitudes towards slide presentations. Students at this age level may view slides as a form of entertainment with a tendency to rate all slides in a positive manner. Slides also may have been viewed on a generalized level with details not seen or not of consequence to the overall impression of the scene.

The questionnaire survey was found to produce more informative results, due in part to its written format which approximated the formal test format used in educational settings.

2. DATA COLLECTION

Data were collected to test the research hypotheses in the areas of environmental preference, awareness, and perception. With regard to slide survey results, the collected data did not fall into clear-cut categories as was hypothesized. In this case students did not perceive the same slide scene groupings as were predicted. As before mentioned, slides may not have been viewed in enough detail for the hypothesized results to occur.

An analysis of data collection results would point to the need for more in-depth study of the possible reasons behind the actual preference choices of students. A more in-depth examination of slide content (preferably with students in the tested age group) could also produce a better understanding of how individual slide scenes were preferred and perceived. This would also provide information on the levels of visual awareness with which sixth-grade students are operating when viewing slides.

3. STATISTICAL ANALYSIS OF TEST DATA

The statistical analyses which were used in this study utilized the SAS program as employed on the Harris system by the Kansas State University Statistics Department.

Reliability coefficients were calculated using the SPSS (Statistical Packages for Computer Analysis) program employed by the Kansas State University Curriculm and Instruction Department.

Standardizing the response rating scales to a well-tested format (five-point Likert) contributed to the collection of quantifiable data and to the ease with which statistical analysis could be performed. All analysis procedures were performed with a high degree of accuracy and produced results of the desired significance needed in this research study.

One area of analysis which could be expanded on in future research studies would be the use of more in-depth factor analysis techniques. This area of statistical analysis has the potential to identify and categorize factors involved in visual perception. Statistical tests for reliability within the hypothesized slide categories did show high degrees of internal consistency. This would indicate a need for further data investigation using other proven factor analysis techniques. Appropriate procedures which could be used include the Guttman-Lingoes Smallest Space Analysis (SSA-III) and the ICLUST as described by Rachel Kaplan (1974).

4. PROGRAM EVALUATION

Statistical analysis did not produce results which showed significant differences between control (non-program) and test (program) participants. Significant differences did occur in regard to certain (four) slide scenes and with one statement on the questionnaire survey. An evaluation of results in each of the three categories of environmental preference, awareness, and perception are as follows.

PREFERENCE - An analysis of these items suggests that the test group displayed a higher preference for certain scenes of designed, naturalistic open spaces. A higher preference was also shown by the test group for a scene of a designed urban space. The higher preference shown for these designed elements would indicate the influence of the environmental design program upon participants slide scene preferences.

AWARENESS - Significant differences in participant response to the questionnaire survey dealing with environmental awareness were also not found. The one statement which the test group rated significantly higher dealt with individual responsibility for environmental quality. This established a trend which was further substantiated with results obtained by factor analysis.

PERCEPTION - Factor analysis was used to identify possible patterns of preference and group test variables (slides and questionnaire) into similiarly perceived categories. Results of this analysis reflected earlier findings which determined that the test group preferred and were more aware of designed features within both naturalistic open space areas and urban open spaces. These results were seen to occur on the slide survey responses which would indicate that trends towards change in visual perception did occur in program participants.

A trend towards change in perception by the test group was shown through factor analysis of questionnaire statements. The test group was found to identify statements which dealt with individual responsibility for landscape appearance and quality. The test group also displayed a slightly increased awareness of natural elements found in the environment. These trends would point to an increased sense of environmental responsibility and awareness to be found in the test group. The effects and influence of the environmental design program could be seen most clearly in these areas. Observable trends can be seen which would indicate the existence of slight changes. A linkage between education and environmental responsibility in these cases illustrates the positive impacts which can occur.

5. STUDY TECHNIQUES

An examination of the overall study results and findings indicates areas of both success and limitation. The analysis of results has identified and established trends in the hypothesized categories for change in test group preference, awareness, and preference. Slight differences were found to exist which could be the direct result of the environmental design education program.

Statistically, significant differences were not found to exist with regard to hypothesized subcategories within the slide and questionnaire surveys. A limitation of the survey was the lack of opportunity to conduct pretesting of students before the environmental design program occured. Logisitics and timing were a problem in this case as was the one year of elapsed time between the actual program and the research study survey.

The effects of elapsed time is a variable which could have contributed also to the slight differences in significant changes. Research findings which identify the effects of time upon student learning and response patterns could provide insight into the results which were obtained in this study.

6. RESEARCH RECOMMENDATIONS AND SUMMARY

A major goal of this study was the measurement and collection of informative data relating to the environmental opinions and views of a specific group of people within our society. The basic format and subject categories employed in this study could be used in the documentation and examination of environmental perceptions of other populations and age groups. Evaluation techniques such as this could be used by professionals, including landscape architects, in the determination of public opinions, needs and wants in regard to environmental design. By becoming aware of society's environmental preferences, awareness and perceptions, educators will be able to implement educational programs which maximize and intensify the levels of learning necessary for the development of environmentally responsible citizenry.

The values and attitudes inherent in society must be recognized by professionals in the environmental design and management fields. The work of integrating human culture upon a finite and fragile natural environment necessitates an inseparable knowledge and awareness of both human and environmental needs.

> "...A land ethic changes the role of Homo sapiens from a conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such" (Leopold 1966, p.240).

The research described in this study has examined the ways in which we as members of the land-community see our environmental roles and responsibilities. Children must learn, must understand the role each can play. Respect and responsibility can be taught through programs such as described and evaluated here.

Education is *the* important link between the relationship of society and environment. The evaluation and knowledge of human perception and attitude towards the natural environment is truly "...the first and most important challenge to a culture."

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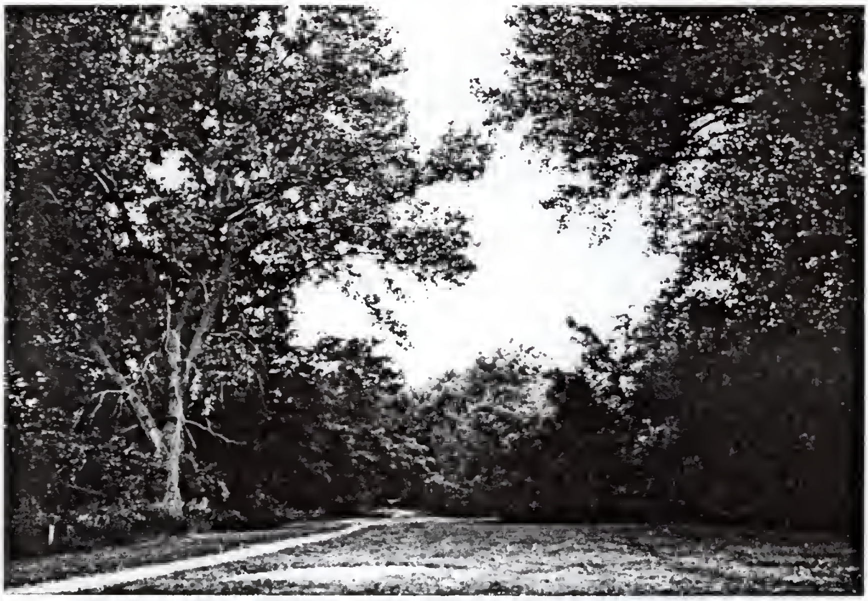
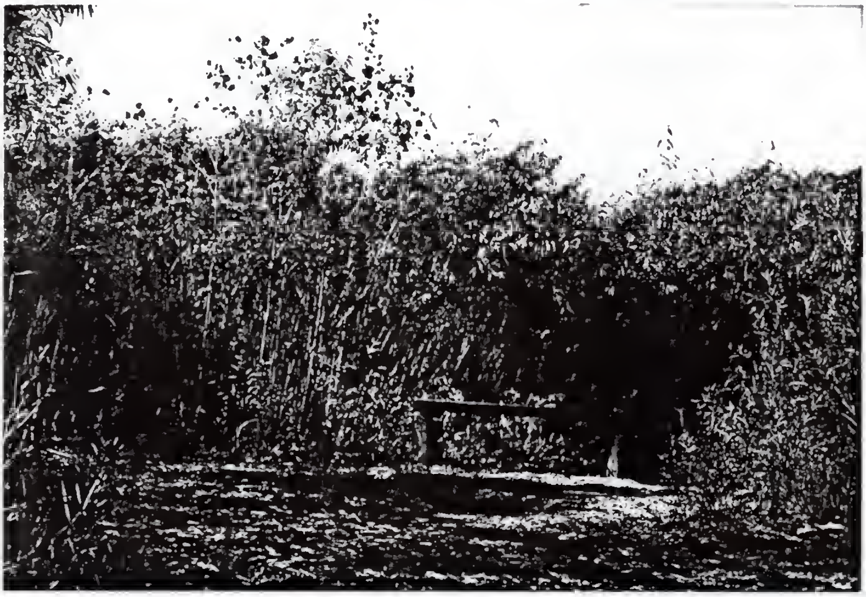
APPENDIX A

SLIDE SCENE EXAMPLES



Slide Scene: Naturalistic Urban Open Space



Slide Scene: Naturalistic Urban Open Space

APPENDIX A

SLIDE SCENE EXAMPLES

Slide Scene: Human Altered-Influenced Urban Open Space

Slide Scene: Human Altered-Influenced Urban Open Space

APPENDIX A

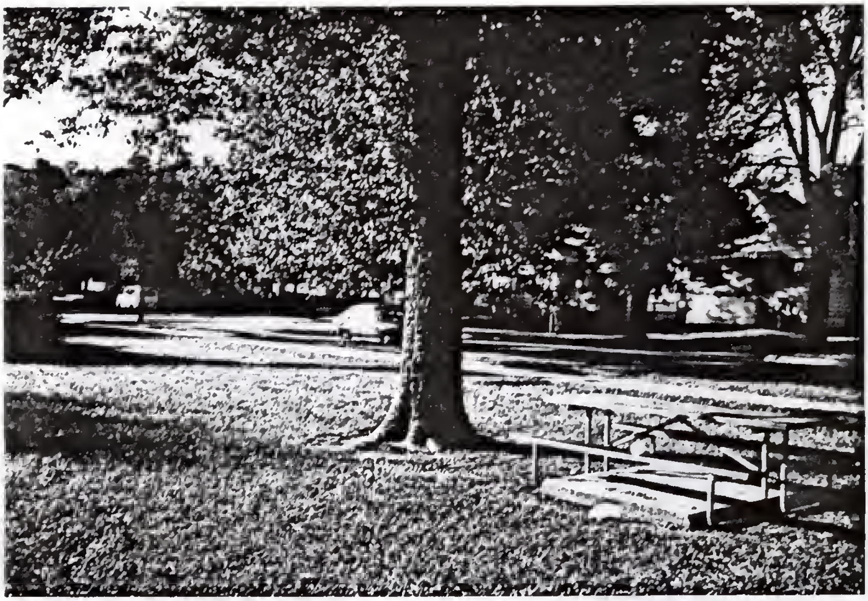
SLIDE SCENE EXAMPLES

Slide Scene: Naturalistic Use/Activity Urban Open Space

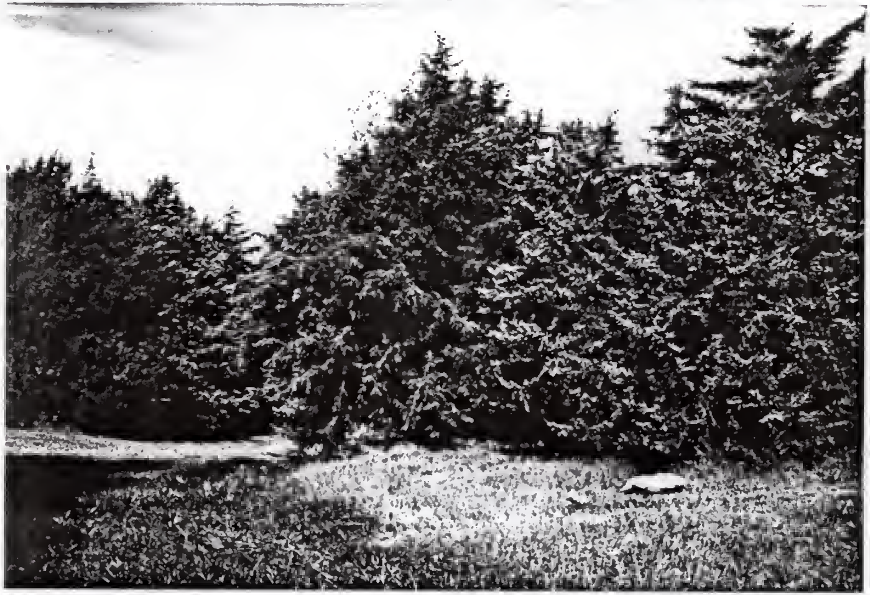
Slide Scene: Naturalistic Use/Activity Urban Open Space

APPENDIX A

SLIDE SCENE EXAMPLES



Slide Scene: Naturalistic Use/Activity Urban Open Space With Visible Signs of Human Misuse



Slide Scene: Naturalistic Use/Activity Urban Open Space With Visible Signs of Human Misuse

APPENDIX B

SLIDE CATEGORIES - RESEARCH HYPOTHESIS

Category	Slide Subject Content	Slide Number
A1.	Naturalistic Urban Open Space	1,5,9,13,17, 21,25,29
A2.	Human Altered-Influenced Urban Open Space	2,6,10,14,18, 22,26,30
A3.	Naturalistic Use/Activity Sites (Urban Open Space)	3,7,11,15,19, 23,27,31
A4.	Naturalistic Use/Activity Sites With Visible Signs of Human Misuse or Alteration (Urban Open Space)	4,8,12,16,20, 24,28,32

APPENDIX C

QUESTIONNAIRE SURVEY

Directions:

The questions on this survey ask you about how you feel about several things. There are no right or wrong answers. Since we want to know how your class in general feels about these things, you don't have to put your name on this form. Here is an example of what you are to do.

	VERY MUCH YES	YES	NOT SURE	NO	VERY MUCH NO
0. I enjoy playing in parks...					

PLEASE CHECK ONE OF THE FIVE ANSWERS AS SHOWN ABOVE.
CHECK ONE ANSWER FOR EACH QUESTION.

The five answers mean this:

VERY MUCH YES....You agree very much, you wouldn't change your mind.
YES...............You agree with it a little bit.
NOT SURE.........You are unsure or don't know if you agree or disagree.
NO...............You disagree with it a little bit.
VERY MUCH NO.....You disagree very much, you wouldn't change your mind.

Read each statement carefully and check one of the five answers according to how you feel about the statement.

	VERY MUCH YES	YES	NOT SURE	NO	VERY MUCH NO
1. I feel bad when I see someone breaking or marking on trees and plants in parks and open spaces.................					
2. Keeping our parks clean and nice to look at would cost too much money...................					
3. If I disagree with something that happens in my city, I should tell someone about it......................					

Survey Questionnaire continued..

	VERY MUCH YES	YES	NOT SURE	NO	VERY MUCH NO
4. We have enough park areas for people to use in our city					
5. One person can make a difference in what happens in our city					
6. People who leave their pop cans and picnic litter on the ground make me angry					
7. We should learn more about the outdoors in our school					
8. Walking downtown is more fun when there are trees along the street					
9. Sometimes people harm our parks and open spaces because no one tries to stop them					
10. I can do something to make schoolgrounds and parks nicer to look at					
11. If I saw someone misusing park equipment I would tell someone about it					
12. I would like to learn how parks and schoolgrounds are designed and built					
13. We can help take care of our parks by suggesting improvements to the people who take care of them					
14. I have more interesting things to do than learn about nature					

Survey Questionnaire continued..

	VERY MUCH YES	YES	NOT SURE	NO	VERY MUCH NO
15. I think there are a lot of problems related to parks and open spaces that I can help solve....................					
16. I think we should have more trees and plants in our parks and playground areas					
17. Parents and teachers can show kids ways to help keep parks and open spaces nicer to look at and use...............					
18. We should worry about problems in the parks and city open spaces in our town.......					
19. I care about the condition of the parks and playgrounds in my area........					
20. There are too many TV programs about problems in the outdoors like pollution and vandalism......................					
21. We should be concerned about the ways our parks and open spaces look..............					
22. There are enough trees and bushes in our parks for birds and animals to live in...........................					

APPENDIX D

QUESTIONNAIRE - RESEARCH HYPOTHESIS

Category	Questionnaire Subject Content	Questionnaire Number
B1.	Quality and Condition of Urban Open Spaces	1,2,4,6,8,16,21,22
B2.	Individual Decisions Affecting Environmental Quality	3,5,9,10,11,13,15,18,19
B3.	Increasing Individual and Group Knowledge of Urban Open Spaces through Environmental Education	7,12,14,17,20

APPENDIX E

BACKGROUND SURVEY

Please answer the following questions about yourself.

1. Your age: ____years old

2. I am a:
____girl
____boy

3. Have you ever lived in any of these places? Put a check mark beside any you have lived in.

____a large city -like Kansas City or
____Wichita
____a smaller city- like Salina
____a real small town
____in the country- but not a farm
____on a farm

4. Please list the cities and states you have lived in.

5. Which of the following activities have you been in ?

____Scouts
____Audubon classes or field trips
____School field trips to nature areas or parks
____4-H

6. Are there parks in your neighborhood? ____Yes ____No

7. How much time do you spend in the parks in your area?

____none at all
____a little
____some
____quite a bit
____very much

Thank you very much for your help. The information you have given me will be very useful in my studies and may benefit people in the future.

APPENDIX F

INFORMED CONSENT AND INTRODUCTION

Hi. My name is Chuck Schrader and I am a graduate student in Landscape Architecture at Kansas State University. Does anyone know what we study in Landscape Architecture? In Landscape Architecture we learn about...............(*Brief description of the profession for explanation).

Right now I am working on a project to see if I can find out what different people think about the landscapes that they live around and use. I would like to find out what kinds of landscapes people like and why they like them. Parks, schoolgrounds, and playfields are examples of landscapes that we all see in our cities.

Today, I want to ask you people some questions, because I am interested in what sixth graders think about this.

For you there are no risks or any direct benefits in being a part of this study. You may refuse to answer any of the questions I may ask. Your participation is entirely voluntary and you may stop at any time.

The slides and questions should take about 20 minutes. This information will not be graded since they are for my study only. You don't need to put your names on these forms. You will not be identified with any of this information or named in any way.

I ask for your help in this study and will appreciate your efforts in being a part of the following program. The information gained in this study will help us learn more about how you feel about our landscapes.

I will be happy to answer any questions now if you have any.

APPENDIX F

First, I am going to show you some slides that are pictures of different kinds of landscapes. I want you to look at each slide and decide how you feel about the landscape that is pictured. After you decide, I want you to check the words on this form that best describes how you feel about that landscape. The words you have to choose from are:

______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

Now we will try a couple for practice. I will put a slide up on the screen and you will put a check beside the words that best describes how you feel.

0. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

0. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

Please turn the page and we will begin.

SAMPLE SLIDE ANSWER FORMAT

-------------START---

1. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

2. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

3. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

4. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

5. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

6. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

7. ______I really like it a lot.
______I like it.
______I'm not sure.
______I don't like it.
______I really don't like it at all.

ENVIRONMENTAL PERCEPTIONS IN RESPONSE TO ENVIRONMENTAL DESIGN EDUCATION

by

Charles C. Schrader

B.S. Wildlife Management, Kansas State University, 1973

AN ABSTRACT OF A MASTERS THESIS

Submitted in partial fulfillment of the

requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1987

ABSTRACT

This research study presents data and analyses on the environmental preferences, awareness, and perceptions of children towards the urban open space environment. Theories and studies in landscape perception and preference, childhood development of environmental awareness, and environmental behavior and dispositions are reviewed and examined. Sixth-grade students were surveyed and preference ratings determined using color slide analysis and questionnaires. Ratings are statistically analyzed to determine whether or not changes in environmental preference and awareness took place as a result of exposure to an environmental design education program. It is found that significant differences did not exist between control and test groups. Trends emerge, however, within the test group which identified an increased awareness for 1) individual responsibility for environmental quality, and for 2) designed features present in naturalistic and urban open space areas.